CLAIMS

1. A method to prepare at least part of at least one surface of a substrate comprising

i.) depositing on the surface at least one plasma monomer from a monomer source wherein during deposition of said monomer said monomer and/or said surface are moved relative to one another to provide a non-uniform plasma polymerised surface; and

ii) introducing to at least part of said plasma polymerised surface a binding entity to provide a non-uniform surface formed from said binding entity.

2. A method as claimed in claim 1 wherein the binding entity interacts covalently with functional groups of the plasma polymerised surface.

3. A method as claimed in claim 1 wherein the binding entity interacts non-covalently with functional groups of the plasma polymerised surface.

4. A method as claimed in claim 2 or 3 wherein a further binding entity interacts with the binding entities which have been introduced on the plasma polymerised surface.

5. A method as claimed in claim 1 wherein the binding entity is selected from the group consisting of cells, metabolites, pharmaceutically active agents, proteins including hormones, antibodies, enzyme, receptor; macromolecules including DNA, RNA, protein fragments, peptides, polypeptides; ligands, proteoglycans, carbohydrates, nucleotides, oligonucleotides, toxic reagents and chemical species.

6. A method as claimed in claim 1 wherein the method comprises the steps of

i.) depositing on the surface at least one plasma monomer from a monomer source wherein during deposition of said monomer said monomer and/or

said surface are moved relative to one another to provide a non-uniform plasma polymerised surface;

ii.) introducing to at least part of said plasma polymerised surface a first binding entity to provide a non-uniform surface formed from said binding entity; and

iii.) contacting said first binding entity with a second binding entity which binds said first binding entity.

7. A method as claimed in claim 1 wherein the method comprises the steps of

i) depositing on the surface at least one plasma monomer from at least two spatially separated monomer sources to provide a non-uniform plasma polymerised surface;

ii.) introducing to at least part of said plasma polymerised surface a first binding entity to provide a non-uniform surface formed from said binding entity; and

iii.) contacting said first binding entity with a second binding entity which binds said first binding entity.

8. A method as claimed in claim 1 wherein the monomer is a volatile alcohol.

9. A method as claimed in claim 1 wherein the monomer is a volatile acid.

10. A method as claimed in claim 1 wherein the monomer is a volatile amine.

11. A method as claimed in claim 1 wherein the monomer is a volatile hydrocarbon.

12. A method as claimed in claim 1 wherein the monomer is a volatile fluorocarbon.

13. A method as claimed in claim 1 wherein the monomer is an ethyleneoxide-type molecule.

14. A method as claimed in claim 1 wherein the monomer is a volatile siloxane.

15. A method as claimed in claim 1 wherein the monomer is selected from the group consisting of N-vinyl pyrolidone, allyl alcohol; acrylic acid; octa-1,7-diene; allyl amine; perfluorohexane; tetraethyleneglycol monoallyl ether and hexamethyl disiloxane (HMDSO).

16. A method as claimed in claim 1 wherein the polymer consists of a single monomer.

17. A method as claimed in claim 16 wherein the monomer consists essentially of an ethylenically unsaturated organic compound.

18. A method as claimed in claim 17 wherein the monomer consists essentially of a single ethylenically unsaturated organic compound.

19. A method as claimed in claim 18 wherein the monomer consists of an ethylene oxide type molecule.

20. A method as claimed in claim 17 wherein the monomer consists of a mixture of two or more ethylenically unsaturated organic compounds.

21. A method as claimed in claim 17 wherein the compound is selected from the group consisting of an alkene containing up to 20 carbon atoms, a carboxylic acid, an alcohol and an amine.

22. A method as claimed in claim 1 wherein the polymer is a co-polymer.

23. A method as claimed in claim 22 wherein the co-polymer comprises at least one organic monomer with at least one hydrocarbon.

24. A method as claimed in claim 1 wherein the monomer is a polymerisable monomer having a vapour pressure of at least $6.6x10^{-2}$ mbar.

25. A method as claimed in claim 1 wherein the monomer (s) is/are deposited on said surface in spatially separated dots.

26. A method as claimed in claim 1 wherein the monomer (s) is/are deposited on said surface in tracks or lines.

27. A method as claimed in claim 25 or 26 wherein the chemical composition and/or functionality of the line, track or dot is non-uniform along its length.

28. A method as claimed in claim 1 wherein the chemical composition and/or functionality of the line, track or dot is non-uniform in its height.

29. A method as claimed in claim 1 wherein the surface comprises non-plasma deposited regions that are comprised of polymerised ethylene-oxide type monomer to provide a non-binding surface.

30. A substrate comprising a surface obtainable by the method according to claim 1.

31. A substrate comprising a plasma polymerised surface wherein said surface comprises at least first and second polymer areas and wherein the composition of said first area is different from said second area characterised in that at least one area has bound thereto a first binding entity to which a second binding entity is bound.

32. A substrate as claimed in claim 30 or 31 wherein the substrate is selected from the group consisting of glass, plastics, nitrocellulose, Poly vinylidene fluoride (PVdF), polycarbonate, poly (methylmathacrylate), nylon, metal, ceramics, quartz, composite structures and silicon wafer.

33. A substrate as claimed in claim 30 or 31 wherein the plastic is selected from the group consisting of polyethylene terephthalate, high density polyethylene, low density polyethylene, polyvinyl chloride, polypropylene and polystyrene.

34. A product comprising a substrate as claimed in claim 30 or 31.

35. A product as claimed in claim 34 wherein said product is part of an assay product.

36. A product as claimed in claim 35 wherein said assay product is a microarray.

37. A product as claimed in claim 35 wherein said assay product is a microtitre plate.

38. A product as claimed in claim 34 wherein said product comprises a microfluidic device or a part.

39. A cell culture system comprising a substrate as claimed in claim 30 or 31 wherein the binding entity provides a surface onto which at least one cell can grow.

40. A cell culture system as claimed in claim 39 wherein the system is part of an assay product.

41. Use of a substrate as claimed in claim 30 or 31 in the separation of biological molecules.

42. Use as claimed in claim 41 wherein the biological molecule is selected from the group consisting of cells, metabolites, pharmaceutically active agents, proteins including hormones, antibodies, enzyme, receptor; macromolecules including DNA, RNA, proteins, peptides, polypeptides; ligands, proteoglycans, carbohydrates, nucleotides, oligonucleotides, toxic reagents and chemical species.

43. A method of screening biological molecules comprising the steps of

i) preparing a substrate as claimed in claim 30 or 31;

ii.) screening the surface of said substrate to determine the binding property of a biological molecule to said surface, wherein said binding property is identifiable by its binding position on said surface; and

iii.) identifying the biological molecule with said binding property.